HW3:

Gaussian Naive Bayes

Submit your assignments on Gradescope. Submit your solution names as HW3.py

Use the provided Python template file, and complete the functions ONLY (DO NOT edit function definitions, code outside the function, or use other libraries).

This is a coding assignment. In this assignment, we will implement the Gaussian Naive Bayes learning algorithm. Documents for this assignment will be available in the relevant folder in course drive:

- HW3_starter_code.py

- iris_training_data.csv

- iris_testing_data.csv

(1) Fill in the ***fit*** function that returns each class's mean, variance, and prior probabilities. See the function definition for input/output types in the starter code.

$$\mu = \frac{1}{N}\sum X$$

$$\sigma = \sqrt{\frac{\sum(x-\mu)^2}{N}}$$

You will train the Gaussian Naive Bayes model in this function. The mean, variance, and prior probabilities. For additional help in debugging, Gradescope will reflect which return items were counted as incorrect.

(2) Fill in the ***gaussian_probability*** function.

In this function, compute the Gaussian probability.

$$\mathbf{P}(x_i|C=k) = \frac{1}{\sqrt{2\pi\sigma_k^2}} e^{\frac{-(x-\mu_k)^2}{2\sigma^2}}$$

(3) Fill in the ***predict*** function. In this function, you will make predictions for the given iris features using the trained Gaussian Naive Bayes model.

$$\widehat{k} = \boldsymbol{argmax}_{k \in C}\, \boldsymbol{log}(\boldsymbol{P}(\boldsymbol{C} = \boldsymbol{k})) + \sum_{1}^{m} \boldsymbol{logP}(\boldsymbol{X}|\boldsymbol{C} = \boldsymbol{k})$$

(4) You will be tested on values, **mean, variance, prior, posterior, and accuracy**.

(5) The code for visualizing the data is provided